Near-Infrared Spectroscopic Measurement of the Effect of Leg Dominance on Muscle Oxygen Saturation during Cycling

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The effect of leg dominance on the symmetry of the biomechanics during cycling remains uncertain—asymmetries have been observed in kinematics and kinetics, while symmetries were found in muscle activation. No studies have yet investigated the symmetry of muscle metabolism during cycling. Near-infrared spectroscopy (NIRS) provides a non-invasive method to investigate the metabolic responses of specific muscles during cycling. **PURPOSE:** To determine whether there was an effect of leg dominance on thigh muscle oxygen saturation (SmO_2) during incrementally loaded submaximal cycling using NIRS. **METHODS:** Eight right leg dominant, untrained subjects (5 men, 3 women; 31±2 yrs; 168.6±1.0 cm; 67.2±1.8 kg, mean ± SE) volunteered to participate. Spectra were collected bilaterally from the vastus lateralis (VL) during supine rest and cycling. SmO_2 was calculated using previously published methods (Zou et al. 2010 *Biomed. Opt. Express*). Subjects pedaled at 65 rpm while resistance to pedaling was increased in 0.5 kp increments from 0.5 kp every 3 min until the subject reached 80% of age-predicted maximal heart rate. SmO_2 was averaged over 3 min for each completed stage. A two-way ANOVA was performed to test for leg differences. A priori contrasts were used to compare work levels to rest. **RESULTS:** VL SmO_2 was not different between the dominant and non-dominant legs at rest and during exercise ($p=0.57$). How SmO_2 changed with workload was also not different between legs ($p=0.32$). SmO_2 at 0.5 kp (60.3±4.0, $p=0.12$) and 1.0 kp (59.5±4.0, $p=0.10$) was not different from rest (69.1±4.0). SmO_2 at 1.5 kp (55.4±4.0, $p=0.02$), 2.0 kp (55.7±5.0, $p=0.04$), and 2.5 kp (43.4±7.9, $p=0.01$) was significantly lower than rest. **CONCLUSION:** VL SmO_2 during cycling is not different between dominant and non-dominant legs and decreases with moderate workload in untrained cyclists. Assuming blood flow is directed equally to both legs, similar levels of oxygen extraction (as indicated by SmO_2) suggests the metabolic load of cycling is not different between legs. This is in agreement with a recent study demonstrating symmetrical increase of muscle activation of the VL during cycling. Leg dominance did not influence VL SmO_2 during submaximal cycling, but may have an effect at higher loads or during other forms of exercise, such as walking and running.